Intergenerational redistribution, health care and politics

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Abstract. Publicly provided health care implies considerable intergenerational redistribution. The possibility of accumulating a fund or debt will affect the degree of redistribution as well as how efficient the financing of health care is. In a voting model we study how governments inability to make binding long-term policy commitments will affect the accumulation of a fund or debt. Today's government will base its policy decisions on expectations about future governments behavior and simply follow suit, which results in strong political inertia. Either a fund or debt may therefore be upheld in political equilibrium. But no mechanism ensure that it is at its optimal level. If there is fund in steady state, the more political clout the old have the smaller will the fund be, i.e saving decrease. If there is debt, however, a politically stronger old generation may imply a smaller debt, i.e. savings increase.

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1. Introduction

Older people utilize more health care than younger people do. While this is true it is also true that younger people are the main contributors to the funding of health care for the elderly, through the taxes they pay. The combined effect is a significant redistribution between generations. In fact, public provision of health care works very much like a pay-as-you-go (PAYG) pension system: the current young contributes money which finances benefits for the current old. And just like the aging of populations in western industrialized countries will pose a challenge to governments' ability to pay for pensions, the financing of health care will also present problems.

One feature that sets health care apart from PAYG pensions, however, is that for health care there is no law regulating what level of services a person is entitled to when old. This is unlike pensions which are usually tied to previous earnings (or alternatively a fixed lump-sum), so that young people know with a reasonable degree of certainty how large pension payments they will receive when they retire. The level of health care services they will receive, on the other hand, will be decided on by the government then in power. There is no way the incumbent government can commit future governments to a certain cause of action, and what is done today can be undone in the future.

In this paper we study the politics of health care provision to the elderly, focusing on issues connected to intergenerational redistribution. We construct an overlapping-generations model in which people live for two periods: they are young and old. In order to focus on peoples' political actions, the agents make no meaningful economic decisions. They consume, pay taxes and vote in both periods of life. The only difference between the young and the old is that only the old utilize health care.

The function maximized by politicians is here taken to be exogenous, but it can be motivated by a probabilistic voting model. The politicians in the model have short time horizons—they only care about people alive at the time for the election. But since the young care about the future when casting their votes in today's election, politicians have to take into account how the policy decisions taken today will affect policy decisions taken by the government in power tomorrow.

Among the questions we then address are: To what extent will expectations about future governments' decisions matter for the decisions taken by today's government? Is it possible to sustain a trust-fund, i.e. a fund accumulated in order to help finance health care in the future? Or will the risk that it can be raided by future governments (to reduce taxes or finance other expenditures) prevent the accumulation of such a fund?

The issue of how policy is set when policy cannot be fixed for more than one time period and different generations are involved in a dynamic game, have been studied in other papers. In Krusell and Ríos-Rull (1996, 1999) they rely on numerical analysis, while in Grossman and Helpman (1998) and Hassler et al (2001) they—just like we do—work out analytical solutions to the Markov perfect equilibria.

Our paper is most closely related to the paper by Grossman and Helpman, in that no private economic decisions are taken. Our model differs from theirs in that we allow governments to accumulate a fund (alternatively issue debt).[1] Another difference yet, is that we focus more on demographics—the relative sizes of different generations—which allow us to relate our results to the discussion about whether a PAYG or a fully funded pension system is to prefer. Finally, in our model both young and old pay taxes, something that has important implications.

We find that a fund can be sustained in steady state equilibrium. The exact value of the fund is uncertain due to the existence of multiple equilibria; which equilibrium one ends up in depends on expectations. Some equilibria are better than others, a better equilibrium being one that requires the government to levy less taxes for a given level of health care expenditure. There is no first order bias in the size of the fund, it can either be too small or too large. A general characteristic, however, is that the fund in steady state

[1] In the Grossman and Helpman model the state variable is the capital stock. But the capital stock depreciates entirely in one period, requiring each generation to reaccumulate the capital stock from scratch.

equilibrium is not adjusted enough in response to, for instance, the population growth rate being larger than the interest rate. So, although in this situation it is optimal to finance health care entirely out of current taxes (or, even better, to run a deficit), a positive fund might be passed on from generation to generation, keeping taxes high for the benefit of nobody.

One of the main findings in the Grossman and Helpman paper is that when the political process gives extra weight to the old, the extra benefit they enjoy will come at the expense of young's savings. Resulting in a lower capital stock or slowed growth. A politically strong old generation is therefore detrimental to welfare. In our model this need not be the case. First, the effect on savings of giving extra weight to old is uncertain. For instance, if we start out with a large enough debt, giving extra weight to old people will reduce the debt, i.e. savings increase. Second, increased savings is welfare improving only if the real interest rate is larger than population growth—which, of course, is a standard result. So, whether giving extra weight to the old in the political process is a good or a bad thing cannot be given a general answer.

2. The model

To focus on politics we propose a simple overlapping generation model where agents' only decision is to vote. Agents live for two periods. In both periods of life, an agent receives an endowment. Let ω^y and ω^o ($\omega^o \leq \omega^y$) be the endowment when young and when old, respectively. Both young and old agents alive at time t pay a lump-some tax τ_t. In addition, the old benefit from health expenditure which is publicly provided. Let h_t be the health status of the old agents at time t and let $\delta \in [0, 1]$ be the discount factor. We denote by U_t^Y the life time discounted utility of a young agent at time t and by U_t^O the utility of an old agent:

$$U_t^Y = \omega^y - \tau_t + \delta(\omega^o - \tau_{t+1}) + \delta h_{t+1}$$

$$U_t^O = (\omega^o - \tau_t) + h_t$$

Additionally we assume that health provision is costly, with cost function $c(h) = h^2/2$. The only role for the government in our model is to levy taxes and provide health to the old. At each time period the health expenditure can be financed with current taxes τ_t and/or with past savings (trust fund) f_t. We assume that the market interest rate is r, that the population grows at rate n and normalize the size of the old to 1.

Assume that the government in office maximizes a weighted average of the (expected) lifetime utilities of the potential voters, with the young receiving weight $1+n$ and the old weight θ. The government, which cannot commit to future taxes and health expenditure, chooses current taxes and health expenditure to maximize G_t:

$$G_t = (1+n)EU_t^Y + \theta U_t^O \tag{1}$$

where $EU_t^Y = \omega^y - \tau_t + \delta(\omega^o - \tau_{t+1}^e) + \delta h_{t+1}^e$, the superscript e denoting expectations. This political objective function can be motivated from so called probabilistic voting models, in which politicians are opportunistic, i.e. purely office motivated. For instance, Lindbeck and Weibull (1989) and Dixit and Londregan (1996), set up models where voters differ in their ideological conviction and decide how to vote based on both ideology and which party offers the highest economic utility. There are two political parties, Right and Left, which both try to win the election by maximizing their respective vote shares. The authors then show that the parties choose their (identical) platforms to maximize a weighted sum of the groups' utilities. The weights reflect population size and how responsive the voters of a group are to economic policy, that is how each group rewards policy with votes at the election.

In our model, each government inherits a trust fund, f_t, from the previous government. By choosing τ_t and h_t the government decides the trust fund f_{t+1} to be passed on to the next generation,

$$f_{t+1}(1+n) = (2+n)\tau_t + (1+r)f_t - \frac{h_t^2}{2}. \tag{2}$$

To set current policies (taxes and health today) the government has to look ahead one period since those agents who are young today will be alive tomorrow and therefore affected by tomorrow's policies. This means that each government when setting the lump sum tax τ_t and the health provision h_t has to forecast tomorrow's government's policies (τ_{t+1}, h_{t+1}). If we do not constrain these forecasts in any way there will be many policy paths that are self-fulfilling. To limit the number of potential paths we will restrict attention to Markov equilibria, as first suggested by Krusell et al (1997). The Markov assumption implies that policies expected for time t will depend only on the values for the state variable expected at that time. Translated to our model, this means that the tax rate and health expenditure at any time t depend only on the value of the fund at time t, f_t. And if at a future date $t+j$ the value of the fund happens to be the same, $f_t = f_{t+j}$, the governments will behave similarly. The political equilibrium will, thus, be two stationary functions $H : \mathbb{R} \to \mathbb{R}^+$ and $T : \mathbb{R} \to \mathbb{R}$, relating the tax policy and the health expenditure to the value of the fund. More formally, let $\tau_t = T(f_t)$, $h_t = H(f_t)$ be the policy functions and write the government's objective function as

$$\begin{aligned}
\max_{\tau_t, h_t} G_t &= (1+n)\left(\omega^y - \tau_t + \delta(\omega^o - T(f_{t+1}) + H(f_{t+1})\right) + \\
&\quad \theta(\omega^o - \tau_t + h_t) \\
\text{subject to } f_{t+1} &= ((2+n)\tau_t + (1+r)f_t - \frac{h_t^2}{2})/(1+n) \text{ and } \tau_t \in (-\infty, \omega^o].
\end{aligned}$$

We solve the problem by guessing a functional form for H and T and using the first order conditions,

$$\frac{\partial G_t}{\partial \tau_t} = -(1+n+\theta) - (1+n)\delta\frac{2+n}{1+n}T'(f_{t+1}) + (1+n)\delta\frac{2+n}{1+n}H'(f_{t+1}) = 0 \tag{3}$$

and

$$\frac{\partial G_t}{\partial h_t} = \theta + (1+n)\delta \frac{h_t}{1+n} T'(f_{t+1}) - (1+n)\delta \frac{h_t}{1+n} H'(f_{t+1}) = 0 \tag{4}$$

to derive a solution.

Let us assume that $H'(f_{t+1}) = 0$ and $T'(f_{t+1}) = c$. Substituting in (3) and (4) we get

$$T'(f_{t+1}) = \frac{-(1+n+\theta)}{\delta(2+n)} \tag{5}$$

and

$$\theta + \delta h_t T'(f_{t+1}) = 0.$$

Solving for T and h_t we obtain

$$\begin{aligned} T(f_{t+1}) &= -\frac{1+n+\theta}{\delta(2+n)} f_{t+1} + \frac{A}{2+n} && (6)\\ h_t &= \frac{\theta(2+n)}{\theta+1+n} = h(\theta, n), && (7) \end{aligned}$$

where expression (6) holds for arbitrary values of A.

These expressions deserve a few comments. First, we have multiplicity of equilibria, namely different tax schedules (6) such that the first order conditions hold. Governments in different periods are willing to follow policy function (6) under the expectations that all future governments will stick to the same policy function.[2]

Second, health care expenditures do not depend on expectations. In fact, health provision depend only on the demographics of the population and on the weight given to the old in the government objective function. So the fund, f, affects only the costs for current tax payers of health provision, but not the level of health provision. Notice also that the efficient level of health care provision is $h = 1$, i.e. $\arg\max_h (h - c(h)) = 1$. This

[2] The upper limit to the tax rate sets an upper bound to the values A can take in equilibrium since the government in power at time $t+1$ cannot be expected to follow (6) if $T(f_{t+1}) > \omega^o$.

level of provision is achieved only when $\theta = 1$ since $h(1, n) = 1$ for all n. The reason why health care might be provided in inefficient amounts is that both the old and the young are constrained to pay the same lump-sum tax.[3] To see this better, notice that in political equilibrium the utility of the old

$$U_t^O = \omega^o - \tau_t + h(\theta, n) \leq \omega^o - \tau_t + 1 + c(h(\theta, n) - c(1) \ \forall\theta \tag{8}$$

since

$$h(\theta, n) - c(h(\theta, n) < 1 - c(1) \ \ \forall\theta \neq 1.$$

From (8) we can see that the current old are willing to pay extra taxes to cover the difference, $c(1) - c(h(\theta, n)$, whenever $\theta < 1$, just to get the efficient level of health. Similarly they are willing to sacrifice the excess health above 1 in exchange for a lower tax whenever $\theta > 1$. Notice that young agents' utility is not lowered with such a change.

Third, after substituting (5) in (3), one can easily see that the first order condition holds with equality for all possible tax rates τ_t. This equation illustrates the conflict of interest between the young and the old in our model. The old agents' utility is larger the lower the tax rate today. In fact, an increase in today's tax rate decreases their consumption by the same amount while leaving the health care they are entitled to unchanged. This has a negative effect of $-\theta$ on the government objective function. Young agents, on the other hand, know that if future governments follow (6), a lower tax rate today (and hence a lower fund tomorrow) will mean a higher tax rate tomorrow. The net effect of an increase in τ_t for the young is positive and equal to $(\theta/(1 + n))$. Consequently, young agent's lifetime utility is higher the higher today's tax rate. This positive effect on the young's utility of an increase in the tax rate has weight $(1 + n)$ on the government objec-

[3] If we allow for different tax rates for the old, $\tau^o \in [-\omega^y, \omega^o]$, and the young, $\tau^y \in [-\omega^o, \omega^y]$, it is easy to show that when $\delta = 1$, $h_t = 1$ for all t, $\tau^o = -\theta f_t + A$ and $\tau^y = \omega^y$ when $\theta > 1, \tau^y = -\omega^o$ when $\theta < 1$ and $\tau^y \in [-\omega^o, \omega^y]$ when $\theta = 1$.

tive and cancels out with the negative effect on the old. Hence, any τ satisfies condition (3).

Since today's government, given its expectations, is indifferent in its choice of τ_t, they are willing to behave in the same manner they expect tomorrow's government to behave, i.e. according to (6).

From the government budget constraint we solve for f_{t+1},

$$f_{t+1} = (\frac{1+r}{1+n} - \frac{1+n+\theta}{(1+n)\delta})f_t + \frac{A - c(h(\theta,n))}{1+n}. \tag{9}$$

To simplify, from now on we will assume that $\delta = 1$. Note that the difference equation (9) has a rest point at $f_t = f^{SS}$, with

$$f^{SS} = \frac{A - c(h(\theta,n))}{(n-r) + 1 + n + \theta}. \tag{10}$$

which is stable whenever

$$\frac{1+r}{1+n} - \frac{1+n+\theta}{1+n} \in (-1, 1). \tag{11}$$

(11) is satisfied whenever

$$\theta < 1 + r.$$

From the budget constraint, we solve for τ^{SS}

$$\tau^{SS}(2+n) = f^{SS}(n-r) + c(h(\theta,n)). \tag{12}$$

First, note that since we have restricted τ_t to be no larger than ω^o a steady state with $f^{SS}(n-r) \geq 0$ can only be sustained if the current generation can pay for the health provision, namely when $(2+n)\omega^o > c(h(\theta,n))$. Second, accumulating a fund is not beneficial in all circumstances. Only when the interest rate is larger than the population growth, i.e. $n > r$, will the existence of a fund be welfare improving since the tax rate is lower than otherwise. Notice that when $n < r$, the steady tax rate is higher the higher the steady state fund. The reason why the young vote for such a high τ^{SS} is because they assume that next generation will follow the tax schedule (6) and a lower tax today (lower f_{t+1}) implies a higher tax tomorrow. In order to illustrate how maintaining a fund can reduce welfare, assume for the sake of simplicity that the government gives weight zero to the old, namely $\theta = 0$. In this case the optimal health provision is 0 and so is the cost, $c(h(0,n)) = 0$. Assume further that $A > 0$ and $n > r$. Then,

$$f^{SS} = \frac{A}{(n-r)+1+n} > 0 \quad \text{and} \qquad \tau^{SS} = \frac{A(n-r)}{(2+n)\left((n-r)+1+n\right)} > 0. \tag{13}$$

and positives taxes can be sustained in equilibrium while everybody would be better of with no taxes at all.

We now substitute (10) in (12) to get an expression for τ^{SS} as a function of the parameters of the model and of the expectations A,

$$\tau^{SS} = \frac{A(n-r) + c(h(\theta,n))(\theta+1+n)}{(2+n)\left((n-r)+1+n+\theta\right)}. \tag{14}$$

Notice that both steady state values, (10) and (12), depend on the expectations A, since the tax schedule is determined up to the constant A.

3. Political clout

In papers analyzing the political economy of pensions, a main conclusion is that powerful political forces support the introduction of pay-as-you-go pensions which is excessive relative to the social optimum (ch. 6, Persson and Tabellini, 2000). One of the "political distortions" keeping public pensions too high is that future generations, though very much affected by the system, do not vote on it. This is a result derived under the assumption that commitment is possible; once in place the social security system remains for more than one period. Is there a problem even if no commitment is possible, as in our model? Will a politically powerful old generation reduce steady state welfare because it makes politicians short-sighted?

We will answer this question by looking at how lifetime utility for a representative generation vary with the relative political strength of young and old. We earlier established that the efficient level of health care provision is $h = 1$ and that this will only be achieved in our model when $\theta = 1$ due to the fact that young and old are constrained to pay the same lump-sum tax. But the fact is that given this constraint on taxes, and hence that we are in a second-best situation, we do not know whether the efficient level of health care provision, $h = 1$, is the one that maximizes lifetime utility.

To see what the second-best optimal health provision is, assume that expectations are such that $f^{SS} = 0$, namely $A = c(h(\theta, n))$. Lifetime utility for a representative generation (net of endowments)

$$h(\theta, n) - 2\tau^{SS} = h(\theta, n) - \frac{2}{2+n} c(h(\theta, n))$$

is maximized at $h = (2 + n)/2$. The effect of population growth is equivalent to a cost reduction since each agent pays $2\tau^{SS}$, but gets $(2+n)\tau^{SS}$ in health expenditure. Lifetime utility will then be maximized at $\theta = 1 + n$, so the old should have more (less) political clout than the young when the population is growing (contracting).

If taxes on young and old are allowed to be different, health care provision will be independent of relative political clout, θ, and always at the efficient level $h = 1$. If the old and the young pay the same tax (second best), health care provision will depend on relative political clout and it will be larger the more political clout old have. Moreover, lifetime utility in steady state will not be maximized when the efficient level of health care is provided, unless the population is constant over time. If there is population growth we should have more health care than the efficient level.

Now we want to see what the effect of θ on lifetime utility is when there is a fund (debt) in steady state. First note that when the steady state fund $f^{SS}(\theta, n, r; A)$ is positive it is decreasing in θ. When $f^{SS}(\theta, n, r; A) \leq 0$ the effect on it of a change in θ is ambiguous, in fact

$$\partial f^{SS}/\partial\theta \gtreqless 0$$

whenever

$$f^{SS}(\theta,n,r;A) \lesseqgtr -\frac{(1+n)(2+n)^2\theta}{(1+n+\theta)^3} = f(\theta,n).$$

Notice that $f(\theta,n)$ takes value 0 at $\theta=0$, is negative for all $\theta>0$, reaches a minimum at $\theta=(1+n)/2$ and $\lim_{\theta\to\infty} f(\theta,n)=0$. For all $A<0$, $f^{SS}(0,n,r;A)<f(0,n)$ and giving some weight to the old reduces the debt. Moreover, we can always find a low enough A such that the steady state debt is always decreasing in θ. In fact for all $A<\bar{A}$, $f^{SS}(\theta,n,r;A)$ is increasing in θ where

$$\bar{A} = -\frac{(2+n)^2(9+17n-8r)}{54(1+n)} < 0.$$

Lifetime utility for a representative generation when $A \neq c(h(\theta,n))$ is (net of endowments)

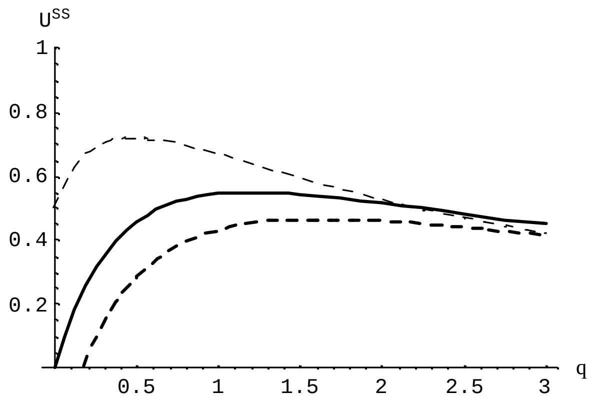
$$-\frac{2A(n-r)}{(2+n)\left((n-r)+1+n+\theta\right)} + h(\theta,n) - \frac{2c(h(\theta,n))(\theta+1+n)}{(2+n)\left((n-r)+1+n+\theta\right)}. \tag{15}$$

Substituting $h(\theta,n)$ we get

$$-\frac{2A(n-r)}{(2+n)\left((n-r)+1+n+\theta\right)} + \frac{\theta(2+n)((n-r)+1+n)}{(\theta+1+n)\left((n-r)+1+n+\theta\right)}. \tag{16}$$

The second term achieves a maximum at $\theta=\sqrt{(1+n)(1+n+(n-r))}$. The first term is decreasing (increasing) in θ whenever $A(n-r)<0$ ($A(n-r)>0$). It is easy to see, adding the two terms that the θ that maximizes lifetime utility is smaller (larger) than $\sqrt{(1+n)(1+n+(n-r))}$ whenever $A(n-r)<0$ ($A(n-r)>0$).

If $n=r$ lifetime utility is maximized at $\theta=1+n$ which is the same as if no fund was available. To have a fund is desirable only when $r>n$ since the returns of the fund can be used to lower the tax rate. When $n > r$ to keep a fund in steady state is inefficient. By increasing the weight given to the old, the inefficiency due to the existence of a positive fund is reduced since the steady state fund is decreasing in θ. This is why it would be optimal to give to the old a higher weight. The argument goes in the opposite direction when $r > n$. In this case the larger the fund the better (and hence it pays to reduce θ). The optimal θ is, in this case, smaller than $(1 + n)$.



Steady state utility (U^{ss}) as a function of θ.

Figure 2 illustrates how the lifetime utility, U^{SS}, changes with θ. We have plotted U^{SS} for $n = r$ (solid line), $n > r$ (thick dashed line) and $n < r$ (thin dashed line) and a value of $A > c(h(\theta, n))$ for all θ. Notice that when $r = n$ the maximum is reached at $\theta = 1 + n$. Since, given A, $f^{SS} > 0$ for all θ, the maximum is reached at a $\theta < 1 + n$ ($\theta > 1 + n$) when $r > n$ ($r < n$), since f^{SS} is decreasing in θ.

4. Conclusions

This paper is, to the best of our knowledge, the first one which studies how health care policy is shaped by the conflict of interest between young and old due to the intergenerational redistribution inherent in public provision of health care. To study this question we propose a simple political economy model which incorporates both intergenerational conflict of interest and governments' incentives in elections. In particular we analyze how the fact that the government in power only consider the welfare of living generations when making policy, affect welfare in the long-run.

Our model features multiple expectational equilibria. Since in equilibrium governments in all periods have the same expectations there is a strong political inertia. This inertia gives rise to one of the main results of the paper, namely that a fund (debt) can be sustained in equilibrium even though everybody would be better off without a fund (debt). There is no mechanism that ensures that a good equilibrium will be selected.

We also analyze how the relative political clout of young and old affects steady state welfare. How strong the old are compared to the young affects both the amount of health care that is provided and how large taxes are. The main conclusion is that if the old are either too strong or too weak lifetime utility for a representative generation will suffer. Whether the old should be politically stronger or weaker than the young depends both on expectations and on whether population growth is higher or lower than the real interest rate.

5. References

Dixit, A. and Londregan, J. (1996), "The Determinants of Success of Special Interests in Redistributive Politics", *Journal of Politics* 58, 1132-55.

Grossman, G. and Helpman, E. (1998), "Intergenerational Redistribution with Short-Lived Governments", *Economic Journal*, September , v. 108, 1299-1329.

Hassler, J., Rodríguez Mora, J. V., Storesletten, K. and Zilibotti, F. (2001), "The Survival of the Welfare State", Institute of International Economics, Stockholm University, mimeo.

Krusell, P., Quadrini, V. and Ríos-Rull, J. V. (1997), "Politico-Economic Equilibrium and Economic Growth", *Journal of Economic Dynamics and Control* 21(1), 243-72.

Krusell, P. and Ríos-Rull, J. V. (1996), "Vested Interests in a Positive Theory of Stagnation", *Review of Economic Studies* 63(2), 301-29.

Krusell, P. and Ríos-Rull, J. V. (1999), "On the Size of the U.S. Government: Political Economy in the Neoclassical Growth Model", *American Economic Review* 89(5), 1156-81.

Lindbeck, A. and Weibull, J. (1987), "Balanced-Budget Redistribution as the Outcome of Political Competition", *Public Choice* 51(), 272-97.

Persson, T. and Tabellini, G. (2000), *Political Economics – Explaining Economic Policy*, MIT Press, Cambridge, Mass.